Cluster Investigations
Pertaining to XXXXXX in City,State

Marilyn S. Radke, MD, MPH
Medical Officer
Health Hazard Evaluations
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

National Institute for Occupational Safety and Health (NIOSH)

- Within the Centers for Disease Control and Prevention (CDC)
- Involved in Occupational Health and Safety Research, Training, and Surveillance
- ~900 employees, the largest center in the CDC
- Located in Atlanta, Cincinnati, Morgantown, D.C., Pittsburgh, Spokane,

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

NIOSH Health Hazard Evaluation Program

- Staff of physicians, epidemiologists, and industrial hygienists
- Investigate and give guidance on occupational safety and health problems
- Conduct over 400 work site evaluations each year

CDC
Centers for Disease Control and Prevention

Cluster Investigation:
The Questions We Need to address…

- What is a Cluster of disease?
- What can you tell us about Cancer clusters?
- What about the number of cancers in this workplace?
- Are the cancers at XXX rare cancer types; the types that have been related to workplace exposures?
- Are there toxic or cancer causing agents related to the cancers found in this workplace?

CDC
Centers for Disease Control and Prevention

Other Questions We Need to address …

- What about the particular diseases in this workplace?
- How can you tell whether these diseases are work-related? What are the clues or tools used ?
- Why isn’t anyone measuring for toxins?
- Why can’t they just measure for lots of things in the workplace and figure out if they are related, kind of sort them out?

CDC
Centers for Disease Control and Prevention

What Is a Cluster?

- Unusual grouping of disease in a defined time period in a specific location

CDC
Centers for Disease Control and Prevention

Random Chance versus a definite reason

CDC
Centers for Disease Control and Prevention

What Do We Know About Cancer?

- "Cancer" is a term representing many diseases with a variety of causes
- Cancer is not a rare event
  - Men-- lifetime risk: 1 man in 2
  - Women-- lifetime risk: 1 woman in 3
- Breast cancer, the most common type of cancer in women, affects one of every seven women

Source: American Cancer Society 2003

Cancer Rates Are Influenced by Many Things

- **Age, race, gender, socio-economic factors**
- **Exposure to External factors (e.g., tobacco, alcohol, chemicals, radiation, and infectious organisms)**
- **Internal factors (e.g., inherited mutations, hormones, immune conditions)**
- **Nutrition, physical inactivity, obesity**

CDC
Centers for Disease Control and Prevention

Cancer and Risk Factors

- **The factors mentioned may act together or in sequence to initiate or promote cancer.**
- **Fifteen or more years may pass between exposures or mutations and detectable cancer.**

CDC
Centers for Disease Control and Prevention

Cancer Rates

- **Because cancer is a common disease, cancer can be found among people at any workplace**
- **For any time period, some working populations have rates above the overall rate, and others have rates below the overall rate**
- **It is important to find out what may be other reasons for the excess**

CDC
Centers for Disease Control and Prevention

What Do We Know About Occupationally Related Cancer?

- **Latency Period**

  Time from exposure to toxin and appearance of disease
  - Most cancers need 15-20 or more years to develop

- **Consistency**

  People who are exposed to the same cancer-causing substances develop the same type of cancer
  - Asbestos exposed workers and Lung Cancer
  - Vinyl Chloride exposed workers and Liver Cancer

CDC
Centers for Disease Control and Prevention

What Else Do We Know About Occupationally Related Cancer?

- **Strength of Association:** this association between exposure and disease shows good science

- **Biological Plausibility**
  - Animal studies
  - Other evidence of exposure-disease link
  - Dose-response link (the more exposure, the more likelihood of disease)

CDC
Centers for Disease Control and Prevention

XXXXXXXXX:
Partial List of Cancers

- X Breast cancers
- X Bladder cancer*
- X Brain tumors*
- X Osteosarcoma
- X Liposarcoma
- X Melanoma*

*Certain cancers linked to different occupational exposur

CDC
Centers for Disease Control and Prevention

Cancer Cluster Evaluation: First Steps

- Validate the cancer diagnoses.
- Check to see if these cancers are known or suspected to be from work exposures.
- If yes, have workers been employed at site of exposure long enough for cancer to develop?

CDC
Centers for Disease Control and Prevention

Cancer Clusters

- **Usually one type of cancer**
- **Consist usually of a rare type of cancer**
- **A type of cancer in a group not usually affected by that cancer, such as a cancer in children that is normally seen in adults**

Common cancers are most often perceived and reported by the public as being part of a cancer cluster

CDC
Centers for Disease Control and Prevention

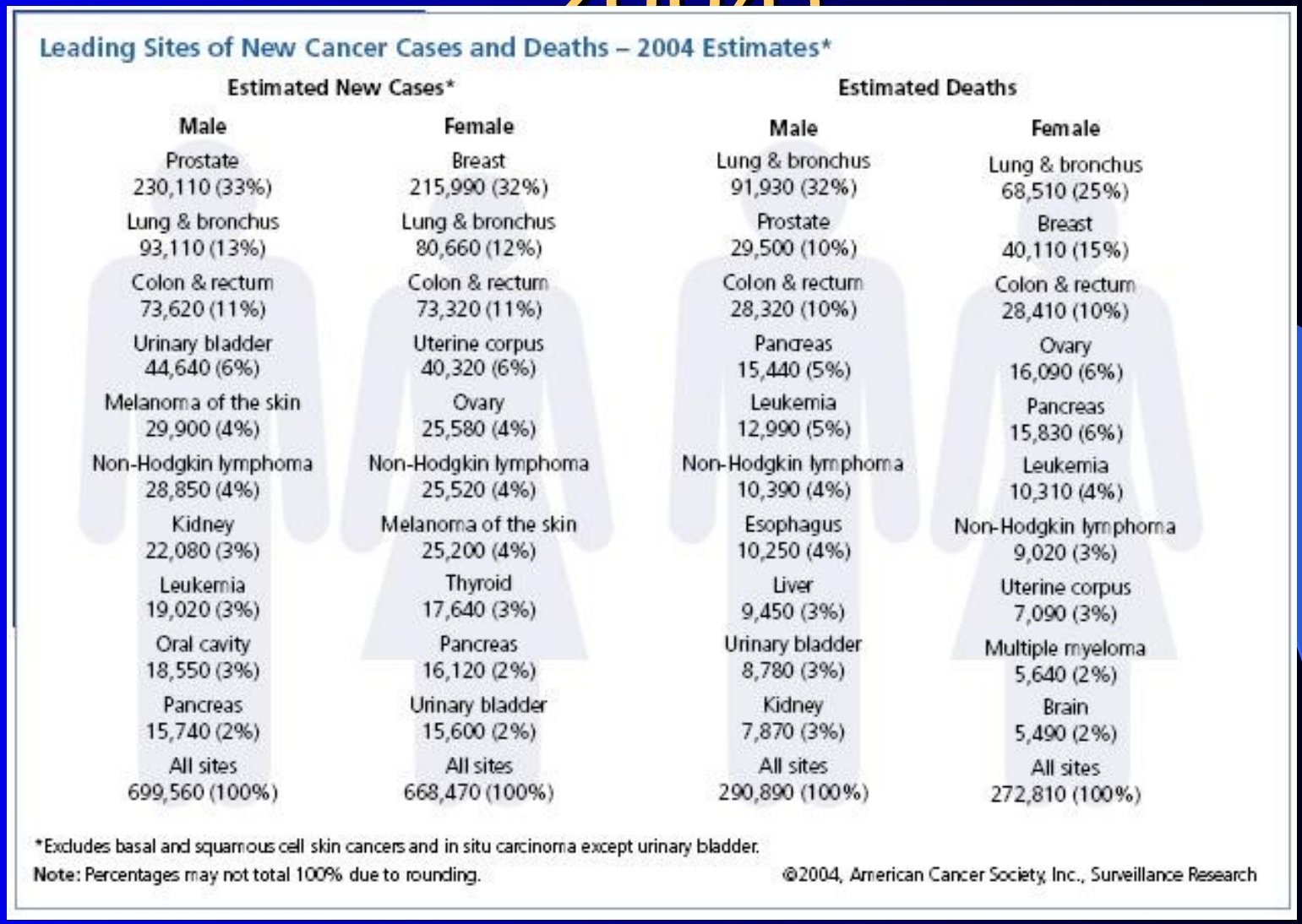
Cancer Type

When the cluster consists of multiple types of cancer, without one type predominating, an occupational cause of the cluster is less likely.

When the types of cancer occurring have been linked with exposures in other settings, we are more likely to make the connection between cancer and a workplace exposure.

CDC
Centers for Disease Control and Prevention

Leading Cancer Sites in Men and Women (ACS 2004)



Leading Sites of New Cancer Cases and Deaths – 2004 Estimates*

Estimated New Cases*		Estimated Deaths	
Male	**Female**	**Male**	**Female**
Prostate 230,110 (33%)	Breast 215,990 (32%)	Lung & bronchus 91,930 (32%)	Lung & bronchus 68,510 (25%)
Lung & bronchus 93,110 (13%)	Lung & bronchus 80,660 (12%)	Prostate 29,500 (10%)	Breast 40,110 (15%)
Colon & rectum 73,620 (11%)	Colon & rectum 73,320 (11%)	Colon & rectum 28,320 (10%)	Colon & rectum 28,410 (10%)
Urinary bladder 44,640 (6%)	Uterine corpus 40,320 (6%)	Pancreas 15,440 (5%)	Ovary 16,090 (6%)
Melanoma of the skin 29,900 (4%)	Ovary 25,580 (4%)	Leukemia 12,990 (5%)	Pancreas 15,830 (6%)
Non-Hodgkin lymphoma 28,850 (4%)	Non-Hodgkin lymphoma 25,520 (4%)	Non-Hodgkin lymphoma 10,390 (4%)	Leukemia 10,310 (4%)
Kidney 22,080 (3%)	Melanoma of the skin 25,200 (4%)	Esophagus 10,250 (4%)	Non-Hodgkin lymphoma 9,020 (3%)
Leukemia 19,020 (3%)	Thyroid 17,640 (3%)	Liver 9,450 (3%)	Uterine corpus 7,090 (3%)
Oral cavity 18,550 (3%)	Pancreas 16,120 (2%)	Urinary bladder 8,780 (3%)	Multiple myeloma 5,640 (2%)
Pancreas 15,740 (2%)	Urinary bladder 15,600 (2%)	Kidney 7,870 (3%)	Brain 5,490 (2%)
All sites 699,560 (100%)	All sites 668,470 (100%)	All sites 290,890 (100%)	All sites 272,810 (100%)

*Excludes basal and squamous cell skin cancers and in situ carcinoma except urinary bladder.

Note: Percentages may not total 100% due to rounding.

©2004, American Cancer Society, Inc., Surveillance Research

CDC
Centers for Disease Control and Prevention

Discovering the Causes of Cancer (Their Etiology) Is a Dilemma

- The time between exposure to a cancer-causing agent and the cancer
- The existence of other risk factors
- The development of cancer growing so slowly for decades before it can be detected

Therefore, causes are sometimes impossible to identify.

CDC
Centers for Disease Control and Prevention

Autoimmune Diseases

These diseases have no association with workplace exposures

- These disease are generally from familial, genetic, or unknown causes
  - Thyroid diseases are in 5-10 % of women
    - Thyroid cancer is different and associated with radiation exposure
  - SLE (lupus) has no known occupational exposure
  - Rheumatoid arthritis has no known occupational exposure

CDC
Centers for Disease Control and Prevention

Conclusions

- We do not believe that the cancers are associated with work at XXXX based on:
  - Scientific information does not link these cancers to occupational exposures
  - Evidence leads to non-occupational causes
  - The different types of cancers do not lead to a common exposure
  - The few cancers which have some association to occupational exposures would not occur in an office setting: high levels of styrene, rubber, petroleum products, sunlight

Therefore, there are no measurements that would assist in a determination

CDC
Centers for Disease Control and Prevention

There are much better ways of getting at cause of disease than doing cluster investigations:

* Cohort (prospective studies)

CDC
Centers for Disease Control and Prevention

So, What Happens Now?

- Information about risk factors, and what is and is **not** work-related is important
- Measuring things in the environment is not always useful – results won't be able to be interpreted
- Concern about cancer and cancer clusters provides an opportunity for people to learn about how they can prevent cancer or identify it early
- Sixty-five percent of public inquiries about cancer clusters involve cancers for which screening and preventive measures exist

CDC
Centers for Disease Control and Prevention

Next Steps

The best steps that people can take regarding cancer are to

- Educate themselves about their personal risk and risk factors for cancer,
- Avoid these risks
- Take advantage of recommended cancer screenings

CDC
Centers for Disease Control and Prevention

Cluster Investigation: The Questions Hopefully Covered…

- What is a Cluster of disease?
- What can you tell us about Cancer clusters?
- What about the number of cancers in this workplace?
- Are the cancers at XXX rare cancer types; the types that have been related to workplace exposures?
- Are there toxic or cancer causing agents related to the cancers found in this workplace?

CDC
Centers for Disease Control and Prevention

Other Questions hopefully addressed …

- What about the particular diseases in this workplace?
- How can you tell whether these diseases are work-related? What are the clues or tools used ?
- Why isn’t anyone measuring for toxins?
- Why can’t they just measure for lots of things and figure out if they are related, kind of sort them out?

CDC
Centers for Disease Control and Prevention

Even Other Questions

- Why isn’t this a good place to study?
- What number of cases would it take for you to do a research study?
- Well, is there research being done to answer some of our questions?

CDC
Centers for Disease Control and Prevention

Other Questions ?

- Website: www.cdc.gov, search on “clusters” or “cancer clusters”
- Questions later:
  - call 1-800-35-NIOSH
  - Ask to be connected to Marilyn S. Radke, MD, MPH

CDC
Centers for Disease Control and Prevention